

AMENDMENTS TO THE DRAWINGS:

The attached sheets of drawings include formal drawings for FIGS. 1-14. These sheets, which are intended to replace the original sheets including FIGS. 1-14, are labeled as Replacement Sheets.

Attachment: Replacement Sheets 1-8.

REMARKS

Favorable reconsideration of this application in view of the remarks to follow is respectfully requested. Since the present Response raises no new issues, and in any event, places the application in better condition for consideration on appeal, entry thereof is respectfully requested.

Before addressing the specific grounds of rejection raised in the outstanding Office Action, applicants have amended Claim 1 in the manner indicated above. Specifically, applicants have amended Claim 1 to positively recite a step of providing a SOI substrate having an SOI layer *of a first thickness* located on a buried insulating layer. Support for this amendment to Claim 1 is found, for example, at paragraph [0047] of the originally filed application and in FIG. 2.

Applicants have also amended Claim 1 to positively recite a step of providing a localized oxide region in said SOI layer *and on top of, and in contact with, an upper surface of said buried insulating layer, wherein said localized oxide regions thins a portion of said SOI layer to a second thickness that is less than said first thickness, said localized oxide region is self-aligned with said channel via and does not extend entirely across said buried insulating layer.* Support for this amendment to Claim 1 is found, for example, at paragraphs [0071], [0072] and FIGS. 7, and 9-14. See also paragraph [0045] of the originally filed application.

Since the above amendments to Claim 1 do not introduce any new matter into the application, entry thereof is respectfully requested. It is noted that the foregoing amendments to Claim 1 should be entered since they provide a better description of the

claimed invention as well as providing structural relationship between the localized oxide region and the corresponding buried insulating and SOI layers.

In the outstanding Office Action, the replacement drawings received on August 2, 2004 were not in compliance with 37 C.F.R. § 1.121(d) since the label "Replacement Sheet" was not used. In response to the drawing objection, applicants submit herewith formal drawings containing FIGS. 1-14 in which each sheet is properly provided with the heading "Replacement Sheet".

Applicants submit that this submission of formal drawings herewith obviates the drawing objection raised in the outstanding Office Action. Reconsideration and withdrawal thereof are thus respectfully requested.

Claims 1-2, 4-5, 6-8, 12, 20, 24, and 26 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures of U.S. Patent No. 6,486,037 to Norcott et al. ("Norcott et al."), U.S. Patent No. 6,566,734 to Sugihara et al. ("Sugihara et al.") and U.S. Patent No. 5,468,657 to Hsu ("Hsu"). Claims 3 and 9 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable under 35 U.S.C. § 103 over the combined disclosures of Norcott et al., Sugihara et al., Hsu and U.S. Patent No. 6,417,078 to Dolan et al. ("Dolan et al."). Claim 27 stands rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu and U.S. Patent No. 6,465,290 to Suguro et al. ("Suguro et al."). Claims 10-12, 20 and 24 stand rejected as allegedly unpatentable over the combined disclosures of Norcott et al., Sugihara et al., Hsu and U.S. Patent Application Publication No. 2003/0186511 to Yiu et al. ("Yiu et al."). Claim 14 stands rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu, Yiu et al.

and U.S. Patent No. 6,162,677 to Miyakawa et al. ("Miyakawa et al."). Claims 15 and 21-23 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu, Yiu, Miyakawa et al. and U.S. Patent Application Publication No. 2002/0153587 to Adkisson et al. ("Adkisson et al."). Claims 16, 18 and 19 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu, Yiu et al., Miyakawa et al., Adkisson et al. and U.S. Patent No. 6,001,706 to Tan ("Tan"). Claim 17 stands rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu, Yiu et al., Miyakawa et al., Adkisson et al. and U.S. Patent No. 5,360,995 to Graas et al. ("Graas et al."). Claim 13 stands rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu, Yiu et al. and U.S. Patent No. 6,673,695 to Lim et al. ("Lim et al."). Claim 25 stands rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures Norcott et al., Sugihara et al., Hsu, Yiu et al. and U.S. Patent No. 6,110,779 to Yang et al. ("Yang et al.").

Applicants respectfully submit that the claims of the present application are not rendered obvious by any of the references cited by the Examiner in the present Office Action. Specifically, none of the applied references, in the ten combinations suggested by the Examiner, teaches or suggests the claimed method of forming a thin channel MOSFET which includes, among other steps, a step of providing *a localized oxide region in said SOI layer and on top of, and in contact with, an upper surface of said buried insulating layer, wherein said localized oxide regions thins a portion of said SOI layer to a second thickness that is less than said first thickness, said localized oxide region is*

self-aligned with said channel via and does not extend entirely across said buried insulating layer.

As such, the claimed method thins the SOI layer by forming a localized oxide region 25 in the SOI layer 19 which is on top of, and in contact with, the buried insulating layer 13. See FIGS. 7, and 9-14 of the present application. The localized oxide region 25 does not extend over the entire surface of the underlying buried oxide and it thins the SOI layer from an initial first thickness to a second thickness, wherein said second thickness is less than said first thickness.

The principal reference in each of the ten obviousness rejections, i.e., Norcott et al., is defect since it does not teach or suggest the claimed step mentioned above. That is, Norcott et al. does not teach or suggest a method wherein *a localized oxide region is formed in said SOI layer and on top of, and in contact with, an upper surface of said buried insulating layer, wherein said localized oxide regions thins a portion of said SOI layer to a second thickness that is less than said first thickness, said localized oxide region is self-aligned with said channel via and does not extend entirely across said buried insulating layer.*

Norcott et al. provides a method of forming a defect induced buried oxide region in a semiconductor substrate. FIGS. 1(a)-1(b) shows one embodiment of the prior art wherein a damaged region 12 and an amorphous region 14 are formed into a bulk or performed SOI substrate. The SOI substrates are shown in FIGS. 5(a)-5(c) Regions 12 and 14 are not oxides at this point of the prior art process, but instead the regions include oxygen ions. After annealing, regions 12 and 14 are converted to buried oxide 16 which is located within the semiconductor layer 10. In the second embodiment of the prior art,

Norcott et al. discloses that an intermediate structure FIG. 1(c) is formed that includes a highly defective Si layer 18 atop a buried oxide 16. Fig. 1(d) shows the annealed structure of FIG. 1(c) including a buried oxide 20. Applicants respectfully submit that Norcott et al. does not teach or suggest the formation of a localized oxide region that is located on and in contact with a buried insulating layer, as presently claimed. In the embodiment where SOI substrates are used, the buried oxide is formed into one of the SOI layers, but Norcott et al. does not teach or suggest that the newly created buried oxide is in contact with the performed buried oxide region.

In addition to the principal reference discussed above, each of the ten rejections include Sugihara et al. as a secondary reference that is used in combination with Norcott et al. Applicants respectfully submit that Sugihara et al. does not alleviate the defects mentioned above to Norcott et al. since the applied secondary reference does not teach or suggest a step of providing the claimed localized oxide region that is on top of and in contact with the buried oxide. Sugihara et al. describes a process of making a FET utilizing a replacement case process. The description of Sugihara et al. is silent in regard to forming a localized oxide within an SOI layer that thins the SOI layer, yet it is located on top of and in contact with a buried oxide layer. This feature, which is present in the claimed method, is absent from the disclosure of Sugihara et al.

In addition to the above references, each of the rejections cites Hsu for allegedly disclosing the claimed localized oxide region. Applicants respectfully disagree since Hsu does not teach or suggest a localized oxide region in addition to a buried insulating layer. Instead, Hsu teaches a method of forming a buried insulating region 40 including nitrogen and oxygen, wherein the content of nitrogen is made higher in the interface

regions 46 and 48 located between the overlying SOI layer 20 and the underlying substrate layer 44. See FIG. 3 of Hsu. A single buried insulating layer is thus described and illustrated in Hsu. Hsu does not teach or suggest a *localized oxide region that is formed in an SOI layer and on top of, and in contact with, an upper surface of a buried insulating layer, wherein said localized oxide regions thins a portion of said SOI layer to a second thickness that is less than said first thickness, said localized oxide region is self-aligned with said channel via and does not extend entirely across said buried insulating layer.* The above mentioned localized oxide region is not taught or suggested in Hsu and the Examiner has not properly indicated where Hsu teaches the presence of such a localized oxide region.

The remaining applied references, namely Dolan et al., Yiu et al., Adkisson et al., Lim et al., Miyakawa et al., Tan, Graas, Yang et al., and Suguro et al., do not alleviate the above defects in the combined disclosures of Norcott et al., Sugihara et al. and Hsu. Applicants note in this regard that none of these other applied references teaches or suggests a method including a step of providing a localized oxide that has the features recited in Claim 1 of the present application. Applicants further note in this regard that the Examiner has relied on each of the above-mentioned references as disclosing specific aspects of applicants' dependent claims. As such, Dolan et al., Yiu et al., Adkisson et al., Lim et al., Miyakawa et al., Tan, Graas, Yang et al., and Suguro et al. are further removed from the processing steps recited in Claim 1 than is the combination of Norcott et al., Sugihara et al. and Hsu


The various §103 rejections also fail because there is no motivation in the applied references which suggest modifying the disclosed methods to include the step of forming

the localized oxide having the structural relationship to the buried insulating layer and the overlying SOI layer as recited in the claims of the present invention. Thus, there is no motivation provided in the applied references, or otherwise of record, to make the modification mentioned above. "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Vaeck, 947 F.2d, 488, 493, 20 USPQ 2d. 1438, 1442 (Fed.Cir. 1991).

The rejections under 35 U.S.C. §103 have been obviated; therefore reconsideration and withdrawal thereof are respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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